BPISAE
RESEARCH ACTIVITIES

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PLANT INDUSTRY STATION, BELTSVILLE, MD. MAY 1951

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The special Congressional Committee to investigate the use of chemicals in food production heard testimony by K.C. Beeson, Director of the Soils and Nutrition Laboratory, Ithaca, N.Y., on the influence of fertilizers on the nutritive value of crops and on the health of animals and man in a recent session.

F.W. Parker, assistant chief, is scheduled to discuss the influence of fertilizers upon (a) the stability and well being of our agricultural economy, (b) the quantity and quality of the crops produced, and (c) the condition of the soil upon which the fertilizer is used. J.R. Magness, head of the Division of Fruit and Vegetable Crops and Diseases, will discuss the necessity for chemicals in fruit and vegetable production and the precautions taken to protect consumers from harmful effects.

Interesting quotations from Dr. Beeson's testimony follow:

"The diet of the United States is made up from a great variety of foods of both plant and animal origin that come from many soils and are produced under many different systems of management. This is a result of our modern methods of food processing and transportation. Any attempt to relate sources of food to human disease is clearly complicated.

"The nutritive quality of the food we eat has become within the last ten or fifteen years a subject of great popular interest--an interest that has been inextricably associated with the soil. More especially the assumption that our soils are now depleted and thus are no longer capable of supplying food at the same nutritional level as our ancestors enjoyed.

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"Since the discovery nearly 100 years ago that goiter was associated with deficiency of iodine in the soil, the food, and the drinking water in certain areas of the world...practically no other direct relationships of importance have been established between the supply of minerals in the soil and the human nutritional troubles resulting from abnormalities of them. The reason may lie in the almost insurmountable complications of long-time experiments with human subjects. Isolated communities dependent upon their own produce might reveal a direct relationship between soils and health of man. However, in the United States few communities are available for study and it probably would not be possible to separate economic and other circumstances from soil conditions as causes. Carefully controlled research is gradually giving us a better understanding of the relations among soils, plants, and animals. This work is progressing slowly. Yet we have gone far enough to see an over-all beneficial effect of fertilizers on the nutritive quality of crops and the health of animals and man."

"Underemployment of Rural Families," a Congressional document recently issued by the Joint Committee on the Economic Report, has important implications for agricultural research in the opinion of Charles E. Kellogg (SS).

The report shows that agriculture science has passed by more than a million farm families. Dr. Kellogg says a fair share of the failure to help poor farm families use science arises from the way recommendations are presented to farmers. Traditionally, research and education have dealt with individual parts of farming systems. They have treated the problems item by item rather than in terms of the whole-farm system.

The overwhelmingly critical factor for those on poor farms who remain in agriculture--and Dr. Kellogg indicates that many families should and will be drawn into industry--is improved skill in management. He underscores the fact that this means the combination of many skills into an effective management system.

The best way to teach this system to a farmer on a poor farm is through a whole-farm demonstration on a farm about like his, managed by a man about like himself. Demonstration farms of this type will require a new research base. They call for pilot-research farms where scientists of several skills work as teams to investigate combinations of practices, analyze and interpret the results, and then offer alternative combinations that give good results according to the various soil patterns and sizes of the farms. As the poor farmer's skill in management increases, credits and grants for farm improvement can be made available within a farm plan.

Dr. Kellogg says enough sound experience is already available with the few pilot-research farms and especially with test-demonstration farms to develop such a program directed toward those poor farm families who stay in agriculture.

Science has only begun to develop chemicals as a farming tool, Bureau Chief R. M. Salter told the National Agricultural Chemicals Association in Miami Beach, Fla., April 4.

He went on to say that in last year's screening tests for plant growth regulating activity, we found more than a hundred new compounds sufficiently active to warrant further study. Thousands more are waiting to be tested and even more are being compounded.

Exploratory studies with various new chemicals suggest a wide range of possible new agricultural uses. For example, chemicals have been found that make plants hold water longer after harvest. Can chemical means be perfected to make plants drought resistant?

Recently plants have been found to be a fertile source of hormone materials for medical purposes. This raises the question whether plant hormones may be used to stimulate forage growth in pastures and meadows or to increase yields and protein content of cereal crops. This field opens up an entire new phase of chemicals in agriculture.

We have indications that it may be possible to use chemicals to modify plant-growth form and plant structure so as to make plants less susceptible to fungi and insect attack. In California, for instance, it has been found that chemicals can be used to make the buttons stick on lemons during marketing and protect the fruit against damage from fungus diseases.

Scientists in England and the United States are much interested in the possibility of incorporating insecticides into the plant's growing system. The field warrants more intensive study.

There may be possibilities, too, for using new chemicals to control soil structure. One chemical company has developed a family of organic compounds that strongly promote soil aggregation. These give much the same effect as organic matter on soil structure. We are just starting laboratory study on the effect of these materials on the important classes of soils in the United States. It is still too early to know whether practical uses may be worked out. (Mimeographed copies of Dr. Salter's talk may be obtained from the Division of Information, BPISAE, Plant Industry Station.)

Pecan investigations illustrate how higher costs are reshaping the research program, F.P. Cullinan told the Southeastern Pecan Growers Association recently. In 1940 with $93,000 for pecan research, the Bureau employed 20 professional workers to conduct studies at 5 locations: - Beltsville, Md.; Albany, Ga.; Shreveport, La.; Meridian, Miss.; and Brownwood, Texas. Currently, although $99,444 is available for pecan investigations, the higher cost of labor and supplies, and the care of larger trees has reduced the amount for direct research. The staff has been cut to 8 professional employees and the research has been consolidated. A central headquarters for chemical analysis has been set up at Shreveport. Disease control studies are carried on chiefly at Albany, and soil management investigations in each of the 4 Southern States.

Trained personnel and continuity of the research staff are critical requirements for speeding up development of hybrid corn production in the Union of South Africa, says Merle T. Jenkins (CC&D). Also needed is adequate research to determine the most suitable hybrid varieties for growing in the different regions and the best cultural practices for weed control, rotations and fertilization.

These are the conclusions reached by Dr. Jenkins during a 6-weeks stay in South Africa where--at the request of the Ministry of Agriculture--he surveyed the potentials of expanding hybrid corn culture. He interviewed more than a hundred research and extension officers and farmers on an inspection tour that took him through the corn producing regions of the Transvaal, Orange Free State, and Natal.

Hybrid corn is still in the experimental stage in South Africa. In his report Dr. Jenkins advises a gradual, orderly development in which hybrid seed corn is introduced and sold to the farmers as one part of a well-rounded program of improved corn culture.

He recommends a coordinated regional program with free interchange of breeding materials and cooperative evaluation as the quickest and most effective way of getting the crop improved. He also points out the need for pathological and entomological support and for basic research in genetics and cytology. His report carries suggestions on methods for seed production, inspection, and certification.

Although American hybrids have not shown much promise for cultivation in South Africa, some of the American inbred lines hold possibilities for use as breeding material. Among these are several inbred lines from Kansas. One top cross involving the local variety Potchefstroom Pearl as seed parent and the Kansas inbred line K64 as male parent now is in limited commercial production. Although not outstanding this hybrid yields and stands better than the parent variety and seems entirely satisfactory for use in training seedsmen and growers in production techniques.

Prior to his trip to South Africa, Dr. Jenkins attended the third international conference on maize improvement in Europe and the Near East. It was held in Clermont-Ferand, France and attended by 40 delegates representing 14 countries. Dr. Jenkins served as FAO consultant in charge of technical phases of the program. For the third year the delegates gave reports of performance trials in the international coordinated testing program of American hybrids. Twenty countries submitted reports this year.

Dr. Jenkins says there is much interest in hybrid corn in Europe and the Near East. American hybrids have performed exceptionally well in many areas and seed production is being rapidly expanded in several countries.

A training film on the manufacture of radioactive fertilizers and their use in agricultural research is in the works at the Atomic Energy Commission. Cameramen will be at Plant Industry Station in June to make various pictures of buildings and laboratories for use in the film.

Recent benefits from agricultural engineering research were highlighted in a talk by J.D. Long, special assistant in Agricultural Engineering, at the Rural Electrification Institute in Burlington, Vt., April 5. He lists:

1. The role engineers played as consultants for the CCC in the purchase of more than $100,000,000 worth of grain storage buildings, bins, and equipment since 1948.

2. The plans and specifications developed by the engineers -- at a cost of 4 percent of the amount of the loan program -- for low-cost farm housing (FHA).

3. The development of a seed cotton drier now in use in more than 5 thousand gins. It has increased the value of cotton ginned an average of $2 a bale and added 20 million dollars annually to the cotton growers' income.

4. The development of a lint-flue cleaner now used in some 1,500 gins. It increases the grade of cotton by about one-third, adds $5 a bale to the value of cotton ginned, and is adding 5 million dollars to growers' income annually.

5. Tests of tractor tires at the U.S. Tillage Laboratory suggest improvements in design that may bring a saving of 10 percent annually in fuel costs for tractor operations.

6. Improvements in machinery for seeding sugar beets have reduced seeding rates from 20 to less than 4 pounds per acre, the labor by one-third, accounts for annual savings in $250,000 for seed, $7,000,000 for labor.

7. Improvements in curing methods and equipment for bright leaf tobacco are reducing costs by 50 percent, hold a potential saving of $10,000,000 a year.

New farm electrical machines developed since World War II and now available to replace hand labor include the crop drier, the gutter cleaner, the automatic poultry feeder, the portable elevator, and the silo unloader. Commenting on these advances at a farm electrification conference at Jackson Mills, W.Va., recently, Arthur W. Turner, assistant chief, said the substitution of electric power for human labor will become increasingly important as farm manpower is recruited for defense.

Among interesting new developments he listed in the research "mill" are: (1) An electric hay mow conveyor designed to distribute partially cured, chopped hay uniformly over the ducts or slatted floor of a forced-air curing system; (2) An electric metering device to regulate the flow of three different materials in a feed grinder. (This will permit materials such as corn, oats, and a mineral-protein supplement to be mixed by the feed grinder as they are ground); (3) The drying of grain by electric heat; (4) Electric ventilating equipment for controlling temperature and humidity in animal shelters and poultry houses.

Magnesium requirements of inbred lines of corn may account for the difficulty of growing some of the Corn Belt lines in the East, says J.D. Sayre (CC&D). His studies using gravel culture indicate that magnesium may have a major effect on the development of plants although it is required in only minor amounts for best growth. The inbred lines show great differences in their requirements for magnesium when grown in gravel culture. Some lines grow as well in solutions containing 2 parts per million as they do in those containing 20 parts per million. Others do not. Dr. Sayre notes that the magnesium of most soils in the Corn Belt is high enough to supply the requirements of most inbred lines. But many soils in Pennsylvania, New Jersey, and New England are too low in magnesium for proper growth of lines that have high requirements. He cites Oh40B and CI. 187-2 as examples.

Tracer studies now underway at Plant Industry Station are expected to give precise information on the persistence of organic insecticides in the soil.

In a paper before the American Chemical Society in Boston last month Homer T. Hopkins and Patricia C. Jackson (Soils) told of their study of the persistence of radioactive chlorinated hydrocarbons in soils from the major regions of the United States.

The experimental design permits the evaluation of organic matter, acidity, texture, and types of clay in relation to soil residues and insecticides. Less accurate semi-quantitative analysis used up to now did not permit estimation of less than 5 pounds of DDT per acre. The tracer technique permits estimates of 1 part per million and can be made with reasonable accuracy for as little as one pound per acre. Results of preliminary studies indicate that chlorinated hydrocarbons persist in the soil for a long time. In Sassafras and Chester soils, for example, the annual rate of disappearance of DDT is about 5 percent per acre and of BHC about 10 percent.

The effect of Bordeaux mixture on coffee production was studied by John C. Dunegan (F&VC&D) in a survey of Guatemala plantings, April 4- 14. He worked in cooperation with the United Fruit Company.

The problem has arisen with the use of commercial banana plantings as a shade crop for coffee in that area. The bananas are sprayed with Bordeaux mixture (from 15 to 17 applications of a 10-10-100 formula annually) to control Sigatoka, a serious fungus leaf spot disease. The question is whether the spray, which also gets on the coffee plants, is responsible for reduced coffee yields. Mr. Dunegan's preliminary survey showed the need for considerable basic research in both soil and plant factors to determine the precise relationship between the chemical treatments and coffee yields.

NEW VARIETIES

COBAL, a new cotton bred at the U.S. Cotton Field Station, Knoxville, Tenn., is being released for seed increase this year. Development of the new variety was made under the supervision of D.M. Simpson (C&OFC&D) and tests made cooperatively by the Division and the Tennessee Experiment Station. Cobal is an early maturing cotton. The bolls open slightly earlier than Empire and are large, fluffy, and easy to pick. The plant type is medium vigorous, well adapted to all cotton soils in Tennessee. The classers staple length is full 1-1/16 to 1-3/32. Lint turn-out is 37 to 40 percent.

SHEYENNE, an improved flax with immunity to all known North American races of flax rust, high resistance to Fusarium wilt, and tolerance to pasmo disease has been released by the North Dakota Station. It comes from a cross of Ottawa 770B with Buda made by H.H. Flor (CC&D) in 1938. A short growing season and uniform ripening make this a good variety for late sowing in the seed flax area of North Dakota and Minnesota. It appears to be best adapted to sections where its earliness enables it to escape early hot weather and drought, that is the southern half of North Dakota and eastern South Dakota.

New aspects of soils and fertilizer research are covered in the proceedings of the fourth annual meeting of collaborators with the Soil and Fertilizer Laboratory. Published in a limited edition (125 copies) the 82-page multilithed report gives changes in project structure in 1950, information on progress in other lines of work not included in the program, and 16 papers presented during the conference, which was held at Plant Industry Station, Feb. 26-28.

Copies of the proceedings have been distributed to project leaders and regional correlators in the Soils Division, to representatives of the 16 State experiment stations participating in the program, and to cooperators in other USDA agencies. If you are interested in seeing a copy, you may borrow one from the office of F.W. Parker (Soils).

Phytophthora leaf blight showed up in hevea rubber plantings in Costa Rica this spring following umusually heavy rains in February--23 inches in comparison with a normal 4 or 5 inch rainfall. The disease, which has occurred sporadically in the Far East, appeared in experimental plantings at Los Diamantes and the commercial plantings of the Goodyear company at Cairo. Bright side of the picture is that the severe outbreak has made it possible to observe resistance to the disease among the large number of top clones in the plantings. Several of the South American leaf-blight-resistant top clones have shown resistance to Phytophthora.

Transparent film contributes to convenience in merchandising prepackaged fruits and vegetables but in no way replaces refrigeration and careful handling as the key factors in maintaining quality.

Summarizing an RMA study recently made in cooperation with the Western Growers Association, H.A. Schomer (F&VC&D) says the results show that 16 of 27 films tested are about equally suitable for packaging vegetables.

The tests indicate that the film should be selected on the basis of cost, transparency, permeability to moisture, tear strength, and adaptability to available equipment for packaging and sealing.

The chief values of film packaging, the results demonstrated, are in merchandising. The film makes it possible to pack the vegetables in a unit and display them attractively. It protects them in shipping and through the marketing system. It retards moisture loss but it does not result in consistently higher nutrient content (sugar and ascorbic acid). The packages should be ventilated to prevent off-odors and flavors from developing in the produce.

NOTES ON PERSONNEL

A roster of eligibles is being set up to meet USDA needs for employees in positions of GS 11 and above. J.P. McAuley, Bureau personnel officer calls our attention to Memorandum No. P-831 from T. Roy Reid, Director of USDA Personnel, announcing the rosters. These are designed to aid recruitment for positions in defense and other essential activities, provide a source of replacement for losses to military service and defense agencies, encourage employees to remain in the Department during the emergency, and implement USDA's career policy. All field and departmental personnel qualified for any position in grade GS 11 and above are encouraged to apply. Positions will be in both Washington and the field. Applications are to be made on standard form 57 and submitted to the Division of Employment, Department of Agriculture, Washington 25, D.C.

L. M. Stahler(WI) has been invited by officials of Plant Protection Ltd., England, to take part in a scientific conference at the Research Station, Fernhurst, June 26-28. A contribution to the Festival of Britain, the agenda will cover some plant protection problems in world agriculture. Dr. Stahler is asked to open the discussions on weed control.

Changes in the Division of Weed Investigations gives W.M.(Bill) Phillips, formerly at Hays, Kansas, responsibility in weed research at Spur, Texas. He takes the place of Dale W. Young, who resigned March 23 to enroll in graduate work at Iowa State College where he will work toward his Ph.D. Vernon W. Woestemeyer, in charge of the bindweed experimental field at Canton, Kansas, will handle the work at Hayes until a successor to Phillips is appointed.

Three Bureau scientists have recently been named to the board of trustees of the American Type Culture Collection, Washington, D.C. These are Nathan R. Smith, H.H. McKinney, and Ross W. Davidson. Freeman A. Weiss (Mycology-ret.) is curator of the Collection.

RETIREMENTS

Falba Love Johnson, editor on special detail to the Division of Cotton and Other Fiber Crops and Diseases, retired March 31 after more than 31 years of service. Miss Johnson is well known to agricultural scientists for her long and excellent service as editor of the JOURNAL OF AGRICULTURAL RESEARCH. She began editing manuscripts for publication in the JOURNAL as a Bureau clerk in 1923. Later she was placed on the editorial staff and she was chief editor from 1945 to 1950. Miss Johnson comes from South Carolina. She is a graduate of South Carolina College for Women and holds an MA from Columbia and an MS from George Washington University. After her return from a trip around the world, Miss Johnson plans to divide her time between Washington and her home in Marion, S.C.

Mildred Albee Stone, principal draftsman (SS), retired March 31 because of disability. Mrs. Stone entered government service in 1918. Her home is at 3217 Patterson Street, N.W., Washington, D.C.

DEATHS

John Ernest Kotila, 58, senior pathologist in Sugar Plant Investigations, died March 27, at his home in Washington, D.C. A native of Hancock, Mich., he was educated at Michigan State College and the University of Michigan. He served as research assistant in plant pathology at State College while earning his doctorate at the University. Coming to the Bureau in 1930 he made an outstanding contribution in the discovery that a deficiency of boron in Michigan soil caused sugar-beet tops to blacken and eventually decay. He showed the condition could be brought under control by the application of ordinary borax to the soil. More recently his research was concerned with strains of Rhizoctonia that cause root rot in sugar beets and other plants. Dr. Kotila leaves his widow, a daughter, Mrs. Custis W. Roane of Blacksburg, Va., and two sons, John Richard and Mauri Ernest of Washington, D.C.

Henri A. Kuyper, 69, who retired in September as principal translator in Sugar Plant Investigations, died at his home in Arlington, Va., April 4. Mr. Kuyper, who was a native of Holland, joined the Bureau as a foreman of labor in the greenhouses in 1926. He was named principal translator in 1930. He leaves his widow.